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(56) Documents Cited

**GB 2139498 A**

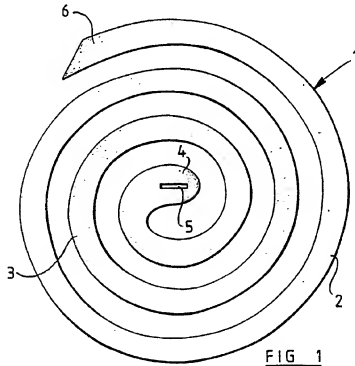
**WPI Abstract Accession No. 90-171708/23**  
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**72-272427/17 and JP72013080B WPI Abstract**  
**Accession No.71-463995/27 and JP 71024279B**  
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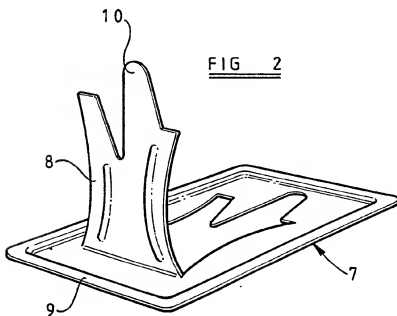
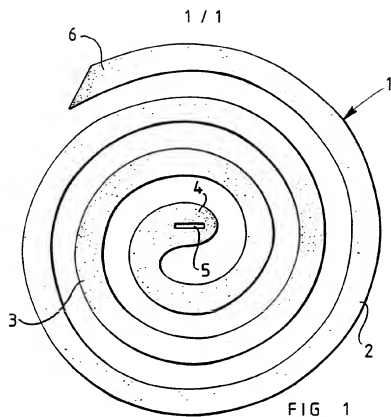
(58) Field of Search

**UK CL (Edition M) A5E ES**  
**INT CL<sup>5</sup> A01N 25/18 25/34**  
**ONLINE DATABASES: WPI**

(54) **Combustible insect repellent or insecticide devices**

(57) A mosquito coil 1 comprises a self-supporting spiral track 2 of combustible material which is adapted to give off insect repellent and/or insecticide fumes as it burns. The combustible material comprises a filler of fine charcoal powder and optionally plant powder, a binder such as gum powder or glue, and an insect repellent and/or insecticide component. Such a coil does not require to be held on a backing sheet, and is substantially smokeless and odourless (unless a perfumed constituent is added) so that a more pleasant environment is provided in the vicinity of the burning coil.





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"Insect Repellant Devices"

This invention relates to insect repellant devices, such as devices commonly known as mosquito coils.

Mosquito coils are widely used throughout the world to repel mosquitos and other insects. Although there are many types of mosquito coil on the market, the most common type of mosquito coil comprises a combustible material which, when it burns, gives off insecticide or insect repellant fumes. Conventionally such mosquito coils are made mainly from wood powder and give off a substantial amount of smoke when burnt. Such smoke can be unpleasant for a person in the vicinity of the burning mosquito coil, and can even sometimes result in an adverse reaction, such as suffocating, coughing, irritation to the eyes/nose and the like. Such conventional mosquito coils also produce an unpleasant odour which can be particularly off-putting to a person who is eating or studying.

It is an object of the invention to provide an insect repellant device which is self-supporting and which considerably decreases or eliminates such effects obtained in use of conventional mosquito coils.

In this specification it is to be understood that the term "self-supporting" is intended to denote that the track of combustible material is supportable by virtue of its own composition and does not require to be held on a backing sheet in order to maintain its structural integrity. Commonly, but not invariably, such a self-supporting track is placed on a metal stand so that the

track can burn freely without burning the supporting surface.

According to the present invention there is provided an insect repellent device as defined by the  
5 accompanying claims.

In a preferred embodiment of the invention such an insect repellent device is intended to overcome the shortcomings of conventional mosquito coils by being substantially smokeless and odourless. This not only  
10 avoids the adverse reactions referred to above but also provides a more pleasant environment in the vicinity of the burning coil and eliminates inhalation of smoke from the coil which is hazardous to human health. Since there is no unpleasant odour associated with burning of the  
15 device, it is also possible as an optional feature for the device to include a perfumed constituent in order to provide a pleasing scent.

In order that the invention may be more fully understood, a preferred form of mosquito coil according to  
20 the invention will now be described, by way of example, with reference to the accompanying drawing, in which:

Figure 1 is a view of the mosquito coil from above; and

Figure 2 is a perspective view of a metal stand  
25 for the coil.

Referring to Figure 1 the mosquito coil 1 is of conventional shape comprising a self-supporting spiral track 2 consisting of a series of turns 3 and having an

inner end 4 provided with a slot 5 and an outer end 6 which is intended to be lit when the coil is to be burnt. In accordance with conventional practice such coils 1 are normally supplied in pairs with the one coil being fitted 5 within the other coil so that the turns of the coils are interleaved.

Figure 2 shows a metal stand 7 which is supplied with the coils and which has a base 9 and a supporting prong 8 which may be bent out of the plane of the base 9 10 as shown to support a coil above the base by means of a finger 10 extending through the slot 5 in the coil.

In one possible example the material from which the coil 1 is formed may comprise the following constituents in the following proportions by weight:

|    |                                  |       |
|----|----------------------------------|-------|
| 15 | Fine Charcoal Powder             | 68%   |
|    | Plant Powder                     | 12%   |
|    | Gum Powder                       | 12%   |
|    | Glue                             | 7.33% |
|    | Sodium Benzoate                  | 0.3%  |
| 20 | Pynamin Forte 90 EC (purity 81%) | 0.37% |
|    | (or 0.30% if pure)               |       |

The plant powder may comprise coconut shell powder. The gum powder may comprise synthetic gum and natural gum (for example, 8 to 15% synthetic gum and 1% to 25 5% natural gum). The glue may comprise starch.

The fine charcoal powder is derived by burning wood to form charcoal and grinding the charcoal to form a fine powder, preferably having a finest particle size of

100-500 mesh, and most preferably having a finest particle size of 200-350 mesh. The nature of the fine charcoal powder is such that, when it is burnt, it does not produce smoke or any perceptible smell (such as is obtained by  
5 burning of wood powder as used in conventional mosquito coils).

During manufacture of the coil the filler constituted by the fine charcoal powder and the plant powder, the preservative constituted by the sodium  
10 benzoate and the binder constituted by the gum powder and the glue are mixed together in dry form. The active ingredient, namely the pynamin forte, together with any added perfumed component, is mixed with water and the resulting mixture is then mixed with the mixed dry  
15 materials to form a paste. The paste is then passed through an extruding machine, a cutting machine and a stamping machine to form the completed mosquito coils.

The nature of the binder used ensures that the coil is harder and stronger than conventional coils so  
20 that it is less likely to fracture in use. Furthermore, because of the use of fine charcoal powder as the filler, the coil is both smokeless and odourless (unless a perfumed component is added) when burnt.

The insect repellant and/or insecticide  
25 component may be a substance other than pynamin forte, such as esbiothrin or natural pyrethrin, although in this case the proportion by weight of the component will require some modification.

The above-described coil is particularly advantageous since little or no smoke is produced during burning of the coil, and also no irritating odour is produced. In addition the coil is of a pleasing appearance, having a smoother surface and lighter overall colour than conventional black coils.

Furthermore the use of a binder comprising gum powder and glue provides both strength and elasticity sufficient to substantially offset the tendency of many conventional self-supporting coils to break before they can be used. The use of plant powder, made from wood, leaves or nut shells for example, as a filler produces a coil of moderate density possessing a degree of elasticity which tends to render the coil less fragile.

The binder will generally comprise both gum powder and glue. The gum powder, which may be constituted solely or partly by natural wood bark powder, serves to facilitate the extruding process and rendering the mixture generally more economical. Furthermore, if required, the starch glue may be replaced by a cellulose-based adhesive which provides added strength. The cellulose-based adhesive is preferably sodium carboxyl methyl cellulose in the form of a white or light yellow powder having a viscosity of 500-800cps (1.37% aqueous solution), a PH value of 6-8 and a moisture content of 10% w/w max.

CLAIMS

1. An insect repellant device comprising an elongate track of combustible material which is self-supporting (as hereinbefore defined) and which is adapted  
5 to give off insect repellant and/or insecticide fumes as it burns, the combustible material comprising a filler of fine charcoal powder, a binder and an insect repellant and/or insecticide component.
2. An insect repellant device according to Claim 1,  
10 wherein the filler further incorporates plant powder.
3. An insect repellant device according to Claim 2, wherein the combustible material incorporates at least 10%, and preferably no more than 30%, and most preferably about 20%, by weight of plant powder.
- 15 4. An insect repellant device according to Claim 1, 2 or 3, wherein the binder includes gum powder.
5. An insect repellant device according to Claim 4, wherein the combustible material incorporates at least 7%, and preferably no more than 15%, and most preferably about  
20 12%, by weight of gum powder.
6. An insect repellant device according to any preceding claim, wherein the binder includes glue.
7. An insect repellant device according to Claim 6, wherein the combustible material incorporates at least 7%,  
25 and preferably no more than 15%, and most preferably about 12%, by weight of glue.
8. An insect repellant device according to Claim 6 or 7, wherein the binder includes starch or a cellulose-



based adhesive.

9. An insect repellant device according to any preceding claim, wherein the combustible material incorporates less than 80%, and preferably less than 75%,  
5 and most preferably less than 70%, by weight of fine charcoal powder.

10. An insect repellant device according to any one of Claims 1 to 8, wherein the combustible material incorporates 40% to 80% by weight of fine charcoal powder.

10 11. An insect repellant device according to any preceding claim, wherein the fine charcoal powder has a finest particle size of 100 to 500 mesh.

12. An insect repellant device according to Claim 11, wherein the fine charcoal powder has a finest particle  
15 size of 200 to 350 mesh.

13. An insect repellant device according to any preceding claim, wherein the combustible material incorporates 8% to 25% by weight of a binder.

14. An insect repellant device according to any  
20 preceding claim, wherein the combustible material comprises the following constituents in the following proportions by weight:

|    |                        |               |
|----|------------------------|---------------|
|    | Charcoal Powder        | 40% to 80%    |
|    | Plant Powder           | 10% to 30%    |
| 25 | Gum Powder             | 7% to 15%     |
|    | Glue                   | 7% to 15%     |
|    | Sodium Benzoate        | 0.3% to 0.5%  |
|    | Pyrethroid Insecticide | 0.05% to 0.4% |

15. An insect repellent device according to any preceding claim, wherein the track is in the form of a coil.

16. An insect repellent device substantially as  
5 hereinbefore described with reference to the accompanying drawing.

Amendments to the claims have been filed as follows

CLAIMS

1. An insect repellant device comprising an elongate track of combustible material which is self-supporting (as hereinbefore defined) and which is adapted to give off  
5 insect repellant and/or insecticide fumes as it burns, the combustible material comprising a filler of fine charcoal powder and plant powder, a binder of gum powder and glue, and an insect repellant and/or insecticide component.
2. An insect repellant device according to Claim 1,  
10 wherein the combustible material incorporates at least 10% by weight of plant powder.
3. An insect repellant device according to Claim 1 or 2, wherein the combustible material incorporates no more than 30% by weight of plant powder.
- 15 4. An insect repellant device according to Claim 1, 2 or 3, wherein the combustible material incorporates about 20% by weight of plant powder.
5. An insect repellant device according to any preceding claim, wherein the combustible material incorporates at  
20 least 7% by weight of gum powder.
6. An insect repellant device according to any preceding claim, wherein the combustible material incorporates no more than 15% by weight of gum powder.
7. An insect repellant device according to any preceding  
25 claim, wherein the combustible material incorporates about 12% by weight of gum powder.
8. An insect repellant device according to any preceding claim, wherein the combustible material incorporates at

least 7% by weight of glue.

9. An insect repellant device according to any preceding claim, wherein the combustible material incorporates no more than 15% by weight of glue.

5 10. An insect repellant device according to any preceding claim, wherein the combustible material incorporates about 12% by weight of glue.

11. An insect repellant device according to any preceding claim, wherein the glue comprises starch.

10 12. An insect repellant device according to any preceding claim, wherein the glue comprises a cellulose-based adhesive.

13. An insect repellant device according to any preceding claim, wherein the combustible material incorporates 40% to 80% by weight of fine charcoal powder.

15 14. An insect repellant device according to any preceding claim, wherein the combustible material incorporates less than 80% by weight of fine charcoal powder.

20 15. An insect repellant device according to claim 14, wherein the combustion material incorporates less than 75% by weight of fine charcoal powder.

16. An insect repellant device according to claim 15, wherein the combustible material incorporates less than 70% by weight of fine charcoal powder.

25 17. An insect repellant device according to any preceding claim, wherein the fine charcoal powder has a finest particle size of 100 to 500 mesh.

18. An insect repellant device according to Claim 17,

wherein the fine charcoal powder has a finest particle size of 200 to 350 mesh.

19. An insect repellent device according to any preceding claim, wherein the combustible material incorporates 8% to

5 25% by weight of binder.

20. An insect repellent device according to any preceding claim, wherein the combustible material comprises the following constituents in the following proportions by weight:

|    |                        |               |
|----|------------------------|---------------|
| 10 | Charcoal Powder        | 40% to 80%    |
|    | Plant Powder           | 10% to 30%    |
|    | Gum Powder             | 7% to 15%     |
|    | Glue                   | 7% to 15%     |
|    | Sodium Benzoate        | 0.3% to 0.5%  |
| 15 | Pyrethroid Insecticide | 0.05% to 0.4% |

21. An insect repellent device according to any preceding claim, wherein the track is in the form of a coil.

22. An insect repellent device substantially as hereinbefore described with reference to the accompanying  
20 drawing.

**Relevant Technical Fields**

- (i) UK Cl (Ed.M) A5E ES  
(ii) Int Cl (Ed.5) A01N 25/18, 25/34

**Databases (see below)**

(i) UK Patent Office collections of GB, EP, WO and US patent specifications.

(ii) ONLINE DATABASES: WPI

Search Examiner  
P N DAVEY

Date of completion of Search  
16 MAY 1994

Documents considered relevant  
following a search in respect of  
Claims :-

**Categories of documents**

- X: Document indicating lack of novelty or of inventive step. P: Document published on or after the declared priority date but before the filing date of the present application.
- Y: Document indicating lack of inventive step if combined with one or more other documents of the same category. E: Patent document published on or after, but with priority date earlier than, the filing date of the present application.
- A: Document indicating technological background and/or state of the art. &: Member of the same patent family; corresponding document.

| Category | Identity of document and relevant passages                                       | Relevant to claim(s)     |
|----------|--|--------------------------|
| X        | GB 2139498 A (FAMILY PRODUCTS) See eg. page 1, lines 77-78                       | 1, 2, 4, 5, 8-10, 13, 15 |
| X        | WPI Abstract Accession No 90-171708/23 and CN 1033920 A (GUCHENG) See abstract   | 1, 15                    |
| X        | WPI Abstract Accession No 72-27242T/17 and JP 7201308 B (KING) See abstract      | 1, 2, 8                  |
| X        | WPI Abstract Accession No 71-46359S/27 and JP 71024279 B (KUSUYAMA) See abstract | 1, 8, 15                 |
| X        | WPI Abstract Accession No 67-01625H/00 and JP 68003919 B (KUSU) See abstract     | 1, 15                    |

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